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Solanaceae

Encyclopædia Britannica Art

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the nightshade, or potato, family of flowering plants (order Solanales), with about 95 genera and at least 2,400 species, many considerable economic importance as food and drug plants. Among the most important of these are the potato (*Solanum tuberosum*); eggplant (*S. melongena*); tomato (*Lycopersicon esculentum*); garden or capsicum, pepper (*Capsicum annuum* and *C. frutescens*); tobacco (*Nicotiana tabacum*); deadly nightshade, the source of belladonna (*Atropa belladonna*); the poisonous jimsonweed (*Datura stramonium*) and nightshades (*S. nigrum*, *S. dulcamara*, and others); and many garden ornamentals, such as the genera *Petunia*, *Lycium*, *Solanum*, *Nicotiana*, *Datura*, *Salpiglossis*, *Browallia*, *Brunfelsia*, *Cestrum*, *Schizanthus*, *Solandra*, *Streptosolen*, and *Nierembergia*.

Members of the Solanaceae family are found throughout the world but are most abundant and widely distributed in the tropical region of Latin America, where about 40 genera are endemic. Very few members are found in temperate regions, and only about 50 species are found in the United States and Canada combined. The genus *Solanum* contains almost half of all the species in the family, including all the species of wild potatoes found in the Western Hemisphere. The poisonous alkaloids present in some species of the family have given the latter its sombre vernacular name of "nightshade."

Members of the family are characterized by solitary or clustered flowers with sepals and petals, five in number and fused; five stamens; and a superior ovary (*i.e.*, one situated above the attachment point of the other flower parts), composed of two fused carpels (ovule-bearing segments) and obliquely placed in the flower upon a basal disk of tissue. The style (upper end of the ovary) is simple and bears a two-lobed stigma, the pollen-receptive surface. The flowers are usually conspicuous and are visited by insects.

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Caryophyllac

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meaning of a
word? Double-
click it to look
it up in
**Merriam-
Webster's
Collegiate
Dictionary**.

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the pink family of flowering plants (order Caryophyllales), comprising some 89 genera and 2,070 species of herbaceous plants, mainly of north temperate distribution. The members are diverse in appearance and habitat; most of them have swollen leaf and stem joints.



Wood stitchwort
(*Stellaria nemorum*)
© David
Woodfall/Natural
History Photographic
Agency

Among the important genera are *Stellaria* (see [photograph](#)); *Cerastium*; *Arenaria* (including sandwort); *Silene* and *Lychnis*; *Gypsophila*; and *Saponaria* (including soapwort). The most valued horticulturally is *Dianthus*, which includes the carnation, commonly cultivated by florists and also grown in Europe for use in perfumes; sweet William, an old-fashioned garden flower; and the cottage, grass, pink. See also [baby's breath](#); [campion](#); [carnation](#); [chickweed](#); [pink](#); [sweet William](#).

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"Caryophyllaceae." *Encyclopædia Britannica*. 2005. Encyclopædia Britannica Online
6 June 2005 <<http://www.search.eb.com/eb/article?tocId=9020585>>.

APA style:
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<<http://www.search.eb.com/eb/article?tocId=9020585>>

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 egalement a utiliser les plantes susmentionnees pour rehabiliter les
 sites a vocation agricole
 d'industries petrolieres, generalement contamines par un melange de ions
 metalliques et de
 contaminants organiques. Ladite plante surpasse toutes les proprietes
 exigees d'un hyperaccumulateur
 ideal, a savoir: croissance generalement vigoureuse, importante biomasse
 (essentiellement les
 feuilles), systeme radiculaire efficace, aptitude a survivre et a
 absorber un vaste gamme de ions
 metalliques. aptitude a retenir les parties de plantes senescentes, sans
 parler des avantages
 economiques potentiels lies aux huiles aromatiques essentielles obtenues
 a partir de la biomasse.

=> s l4 and metal (3a) accumulating (2a) crop?

21 FILES SEARCHED...

40 FILES SEARCHED...

L6 6 L4 AND METAL (3A) ACCUMULATING (2A) CROP?

=> s l6 npr py>1999

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 PATDPA, PATDPAFULL, PATDPASPC, PCTFULL, ...' ENTERED AT 10:13:07 ON 06
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 L2 1372 S (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM
 L3 1001 S (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM
 L4 229 S L3 NOT PY>1999
 L5 210 DUP REMOV L4 (19 DUPLICATES REMOVED)
 L6 6 S L4 AND METAL (3A) ACCUMULATING (2A) CROP?

=> d l6 1-6

L6 ANSWER 1 OF 6 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1999007830 PCTFULL ED 20020515
 TIEN TRANSGENIC PLANTS OF ALTERED MORPHOLOGY AND THE ISOLATED i(ARABIDOPSIS
 THALIANA) ENDO-1,4-β-GLUCANASE **GENE**, PROMOTER AND PROTEIN
 TIFR PLANTES TRANSGENIQUES A MORPHOLOGIE MODIFIEE ET **GENE**,
 PROMOTEUR ET PROTEINE DE L'ENDO-1,4-β-GLUCANASE ISOLEES A PARTIR
 D'ARABIDOPSIS THALIANA
 IN SHOSEYOV, Oded;
 SHANI, Ziv;
 SHPIEGL, Etai
 PA YISSUM RESEARCH DEVELOPMENT COMPANY OF THE HEBREW UNIVERSITY OF
 JERUSALEM;
 SHOSEYOV, Oded;
 SHANI, Ziv;
 SHPIEGL, Etai
 LA English
 DT Patent
 PI WO 9907830 A1 19990218
 DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
 FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR
 LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG

SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW GH GM KE LS MW
SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK
ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA
GN GW ML MR NE SN TD TG

AI WO 1998-IL345 A 19980726
PRAI IL 1997-121404 19970727
US 1998-09/006,632 19980113
US 1998-09/006,636 19980113
ICM C12N005-04
ICS C12N005-14; C12N009-00; C12N009-36; C12N009-42; C12N015-05; C12N015-29;
C12N015-31; C12N015-63; C12N015-82; A01H005-00; A01H005-10

L6 ANSWER 2 OF 6 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1994029466 PCTFULL ED 20020513
TIEN PHYTOREMEDIATION OF METALS
TIFR PHYRODECONTAMINATION DE SOLS CONTAMINES PAR DES METAUX
IN RASKIN, Ilya;
KUMAR, Nanda, P., B., A.;
DOUCHENKOV, Slavik
PA PHYTOTECH, INC.
LA English
DT Patent
PI WO 9429466 A1 19941222
DS W: AT AU BR BY CA CN CZ HU JP PL RU SK UA AT BE CH DE DK ES
FR GB GR IE IT LU MC NL PT SE

AI WO 1994-US6178 A 19940602
PRAI US 1993-8/073,258 19930604
US 1994-8/252,234 19940601
ICM C12N015-82
ICS B09B003:00; A01H005:00

L6 ANSWER 3 OF 6 USPATFULL on STN
AN 1999:167132 USPATFULL
TI Arabidopsis thaliana endo-1,4- β -glucanase **gene** and
promoter
IN Shoseyov, Oded, Karme Yosef, Israel
Shani, Ziv, Rehovoth, Israel
PA Yissum Research Development Company of the Hebrew University of
Jerusalem, Israel (non-U.S. corporation)
PI US 6005092 19991221
AI US 1998-6636 19980113 (9)
PRAI IL 1997-121404 19970727
DT Utility
FS Granted
LN.CNT 3268
INCL INCLM: 536/023.600
INCLS: 536/024.100; 800/278.000; 800/290.000; 435/209.000; 435/320.100;
435/419.000; 435/468.000
NCL NCLM: 536/023.600
NCLS: 435/209.000; 435/320.100; 435/419.000; 435/468.000; 536/024.100;
800/278.000; 800/290.000
IC [6]
ICM: C12N005-04
ICS: C12N015-29; C12N015-56; C12N015-82
EXF 536/23.6; 536/24.1; 435/209; 435/298; 435/320.1; 435/419; 435/440;
435/468; 800/276; 800/278; 800/288; 800/290; 800/295; 800/298;
800/DIG.9; 800/52; 800/200; 800/205
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L6 ANSWER 4 OF 6 USPATFULL on STN
AN 1999:84758 USPATFULL
TI Conversion of metal oxidation states by phyto reduction
IN Salt, David E., 231 Montgomery St., Highland Park, NJ, United States
08904
Raskin, Ilya, 48 Alexandria Dr., Manalapan, NJ, United States 07726
Kumar, Nanda P. B. A., 547 Starkey Apartments, New Brunswick, NJ, United
States 08903
Douchenkov, Slavik, 353 Crosspointe Dr., East Brunswick, NJ, United

States 08816
PI US 5928406 19990727
AI US 1994-333143 19941101 (8)
RLI Continuation-in-part of Ser. No. US 1994-252234, filed on 1 Jun 1994
which is a continuation-in-part of Ser. No. US 1993-73258, filed on 4
Jun 1993, now patented, Pat. No. US 5364451, issued on 15 Nov 1994
DT Utility
FS Granted
LN.CNT 1444
INCL INCLM: 075/712.000
INCLS: 210/602.000; 405/128.000; 423/DIG.017; 588/256.000
NCL NCLM: 075/712.000
NCLS: 210/602.000; 405/128.100; 405/128.150; 423/DIG.017; 588/256.000
IC [6]
ICM: C21B003-18
EXF 075/712; 210/602; 405/125; 423/DIG.17; 588/256
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L6 ANSWER 5 OF 6 USPATFULL on STN
AN 1998:88246 USPATFULL
TI Phytoremediation of metals
IN Raskin, Ilya, 48 Alexandria Dr., Manalapan, NJ, United States 07726
Kumar, Nanda P. B. A., 547 Starkey Apartments, New Brunswick, NJ, United
States 08903
Douchenkov, Slavik, 353 Crosspointe Dr., East Brunswick, NJ, United
States 08816
PI US 5785735 19980728
AI US 1994-252234 19940601 (8)
RLI Continuation-in-part of Ser. No. US 1993-73258, filed on 4 Jun 1993, now
patented, Pat. No. US 5364451
DT Utility
FS Granted
LN.CNT 1149
INCL INCLM: 075/711.000
INCLS: 210/602.000; 075/712.000
NCL NCLM: 075/711.000
NCLS: 075/712.000; 210/602.000
IC [6]
ICM: C22B003-24
EXF 075/710; 075/711; 071/DIG.2; 071/99; 071/903; 210/602
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L6 ANSWER 6 OF 6 USPATFULL on STN
AN 94:99509 USPATFULL
TI Phytoremediation of metals
IN Raskin, Ilya, Manalapan, NJ, United States
Kumar, Nanda P. B. A., New Brunswick, NJ, United States
Douchenkov, Slavik, East Brunswick, NJ, United States
PA PhytoTech, Inc., Morristown, NJ, United States (U.S. corporation)
PI US 5364451 19941115
AI US 1993-73258 19930604 (8)
DT Utility
FS Granted
LN.CNT 671
INCL INCLM: 075/710.000
INCLS: 071/009.000; 210/602.000; 210/682.000; 210/688.000
NCL NCLM: 075/710.000
NCLS: 071/009.000; 210/602.000; 210/682.000; 210/688.000
IC [5]
ICM: C21B009-00
ICS: C22B009-00
EXF 075/710; 210/602; 210/682; 210/688; 071/9
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> d 16 1-6 ab

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ABEN The present invention discloses genetically engineered plants which display altered structure or morphology. The transgenic plants express a cell wall modulation transgene or **gene** construct that results in the altered structure or morphology. The altered structure or morphology can be associated with, for example, altered biomass, growth, yield, greater or less resistance to biodegradation, more or less digestible to ruminants, altered cellulose content, larger leaves/normal hypocotyls or smaller leaves/longer hypocotyls, etc. compared to a non-transgenic plant of the same species. The cell wall modulation transgene can be any cellulose binding domain, a cellulose binding protein, or a cell wall modifying protein or enzyme such as endoxyloglucan transferase, xyloglucan endo-transglycosylase, an expansin, cellulose synthase, or a novel isolated endo-1,4- β -glucanase of *Arabidopsis thaliana*. The invention also discloses transgenic plants containing a **gene** construct comprising a promoter operably linked to the cell wall modulation protein or polypeptide **gene** and may further comprise a sequence encoding a secretion signal peptide. In particular, the invention discloses transgenic plants containing a **gene** construct comprising the cell promoter, operably linked to the cell signal peptide and any cellulose binding domain.

ABFR L'invention concerne des plantes mises au point par génie génétique, qui présentent une modification de structure ou de morphologie. Ces plantes transgéniques expriment un transgène de modulation de la paroi cellulaire ou une construction de **gène** entraînant ladite modification de structure ou de morphologie. Cette modification peut être associée, par exemple, à une modification de la biomasse, de la croissance ou du rendement, à une augmentation ou à une diminution de la résistance à la biodegradation ou de la digestibilité pour les ruminants, à une modification de la teneur en cellulose, à des feuilles plus grandes/des hypocotyles normaux ou bien à des feuilles plus petites/des hypocotyles plus longs, etc., par rapport à une plante non transgénique de la même espèce. Le transgène de modulation de la paroi cellulaire peut être n'importe quel domaine de liaison de la cellulose, une protéine de liaison de la cellulose, ou bien une protéine ou une enzyme modifiant la paroi cellulaire, telle que l'endoxyloglucane transferase, la xyloglucane endo-transglycosylase, une expansine, la cellulose synthase ou une nouvelle endo-1,4- β -glucanase extraite de *Arabidopsis thaliana*. L'invention concerne également des plantes transgéniques contenant une construction de **gène** qui renferme un promoteur fonctionnellement lié au **gène** d'une protéine ou d'un polypeptide de modulation de la paroi cellulaire, ainsi éventuellement qu'une séquence codant pour un peptide signal de sécrétion. L'invention concerne en particulier des plantes transgéniques contenant une construction de **gène** qui renferme le promoteur cellulaire, fonctionnellement lié au peptide signal cellulaire et à un domaine de liaison de la cellulose.

described. The process is based on manipulating the growth of **crop** and **crop**-related members of the plant family Brassicaceae in metal-containing soils so that the metal in the soils is made more available to the plants. These particular plants will absorb metals into their roots making the metals non-leachable from the soils or will absorb the metal into their roots and transfer them to the shoots and/or roots which can be easily harvested.

ABFR Procédé d'extraction des ions métalliques contenus dans la terre et procédés d'extraction associés. Le procédé consiste à manipuler la croissance des cultures et des éléments liés aux cultures de la famille de plantes Brassicaceae dans des sols contenant des métaux afin que le métal présent dans ces sols soit plus disponible pour les plantes. Ces plantes spécifiques absorbent les métaux dans leurs racines, les métaux ne pouvant plus par conséquent être lessivés des sols, ou bien elles absorbent le métal dans leurs racines et les transfèrent aux pousses et/ou aux racines qu'on peut facilement récolter.

L6 ANSWER 3 OF 6 USPATFULL on STN

AB The present invention discloses genetically engineered plants which display altered structure or morphology. The transgenic plants express a cell wall modulation transgene or **gene** construct that results in the altered structure or morphology. The altered structure or morphology can be associated with, for example, altered biomass, growth, yield, greater or less resistance to biodegradation, more or less digestible to ruminants, altered cellulose content, larger leaves/normal hypocotyls or smaller leaves/longer hypocotyls, etc. compared to a non-transgenic plant of the same species. The cell wall modulation transgene can be any cellulose binding domain, a cellulose binding protein, or a cell wall modifying protein or enzyme such as endoxylglucan transferase, xyloglucan endo-transglycosylase, an expansin, cellulose synthase, or a novel isolated endo-1,4- β -glucanase of *Arabidopsis thaliana*. The invention also discloses transgenic plants containing a **gene** construct comprising a promoter operably linked to the cell wall modulation protein or polypeptide **gene** and may further comprise a sequence encoding a secretion signal peptide. In particular, the invention discloses transgenic plants containing a **gene** construct comprising the cell promoter, operably linked to the cell signal peptide and any cellulose binding domain. Methods for modulating plant growth by transgenic expression of a cell wall modulating protein or polypeptide are also disclosed. The present invention also discloses a novel, isolated *Arabidopsis thaliana* endo-1,4- β -glucanase **gene** (cell), its promoter (cell promoter) and polypeptide (Cell) and recombinant **nucleic acid vectors** containing the cell **gene** with or without a secretion signal peptide sequence and/or the cell promoter.

L6 ANSWER 4 OF 6 USPATFULL on STN

AB The present invention provides a method for remediating soil contaminated with Cr(VI) by reducing the Cr(VI) to Cr(III) in the soil. The method involves contacting the contaminated soil with a plant that accomplishes the reduction. Removal of the plant from the environment is not required; in fact, preferred embodiments of the invention involve plowing the plant back into the soil environment and replanting the soil.

L6 ANSWER 5 OF 6 USPATFULL on STN

AB A process for removal of metal ions from soil and methods for effecting such removal are described. The process is based on manipulating the growth of **crop** and **crop**-related members of the plant family Brassicaceae in metal-containing soils so that the metal in the soils is made more available to the plants. These particular plants will

absorb metals into their roots making the metals non-leachable from the soils or will absorb the metal into their roots and transfer them to the shoots and/or roots which can be easily harvested.

L6 ANSWER 6 OF 6 USPATFULL on STN

AB A process for removal of metal ions from soil and methods for effecting such removal are described. The process is based on the growth of **crop** and **crop**-related members of the plant family Brassicaceae in metal-containing soils. These particular plants will absorb metals into their roots making them not leachable from the soils or will absorb the metal into their roots and transfer them to the shoots which can be easily harvested.

=> s l4 and (tomato or potato or pepper or eggplant or petunia or lycium or solanum or datura or silenena) and metal (3a) (accumulat?)

13 FILES SEARCHED...

20 FILES SEARCHED...

29 FILES SEARCHED...

40 FILES SEARCHED...

L7 46 L4 AND (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM OR SOLANUM OR DATURA OR SILENA) AND METAL (3A) (ACCUMULAT ?)

=> s l7 1-10 kwic

MISSING OPERATOR L7 1-10

The search profile that was entered contains terms or nested terms that are not separated by a logical operator.

=> d l7 1-10 kwic

L7 ANSWER 1 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

AB Transgenic **potato** and tobacco that are able to selectively extract and **accumulate** heavy **metals** in their tissues and can be used for clean-up of contaminated soils are described. These plants were obtained by the introduction of the metallothionein **gene** from the fungi *Neurospora crassa* into the **potato** and the tobacco species by a standard transformation method. Comparative studies of control and transgenic plants were carried out on.

ST cadmium copper accumulation transgenic tobacco **potato**

IT **Gene**, microbial

RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)

(MT; metallothionein **gene** from *Neurospora crassa* in transformation of plants capable of accumulating copper and cadmium)

IT *Neurospora crassa*

(metallothionein **gene** from *Neurospora crassa* in transformation of plants capable of accumulating copper and cadmium)

IT Metallothioneins

RL: BSU (Biological study, unclassified); BIOL (Biological study)

(metallothionein **gene** from *Neurospora crassa* in transformation of plants capable of accumulating copper and cadmium)

IT **Potato** (*Solanum tuberosum*)

Soil pollution

Tobacco

Transformation, genetic

(transgenic plants capable of accumulating copper and cadmium)

L7 ANSWER 2 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

AB . . . heavy metals is proposed. Clean-up of soil is achieved by seeding transgenic plants that are able to selectively extract and **accumulate** heavy **metal** cations. Transgenic plants were obtained by the introduction of the metallothionein **gene** into the **potato** and the tobacco by transformation method. These plants rendered to be stable on contaminated surroundings while control plants got dark. . . concentration of copper and cadmium in tissues of transgenic plants was much higher comparatively with control plants. Application of MT **genes** from some organisms that are able to

specific binding of heavy metals opens the way to obtaining transformed plants providing.

ST heavy metal soil pollution bioremediation; metallothionein **gene**
soil pollution phytoremediation

IT Metallothioneins
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(**gene**; clean-up of contaminated lands from heavy metals using transgenic plants)

L7 ANSWER 3 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

AB . . . cell exts. of this material by gel permeation HPLC revealed the presence of complexes with a similar retention time to poly(γ -**glutamylcysteinyl**)glycine metal complexes extracted from cell suspension cultures of *Datura innoxia*. However, the peaks corresponding to metal associated with these complexes in HPLC profiles of exts. from *Rhynchosstegium* were low, . . . and Cd in *Rhynchosstegium* from contaminated sites which were bound by these complexes, expressed as a percentage of the total **metal accumulated** by the moss, ranged from 0.06 to 0.65% for Cu and 0.24 to 2.08% for Cd.

IT 7440-43-9D, Cadmium, poly(**glutamylcysteinyl**)glycine complexes
7440-50-8D, Copper, cadmium or copper complexes 7440-50-8D, Copper, poly(**glutamylcysteinyl**)glycine complexes 7440-50-8D, Copper, thiol complexes
RL: FORM (Formation, nonpreparative)
(formation of, in freshwater moss, after exposure to heavy metals)

L7 ANSWER 4 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

TI Poly(γ - **glutamylcysteinyl**)glycine: its role in cadmium resistance in plant cells

AB . . . in the presence of normally toxic concns. of certain trace metal ions. The addition of Cd and Cu to Cd-resistant *Datura innoxia* cell cultures results in the rapid synthesis and **accumulation** of S-rich, **metal-binding** polypeptides. The structure of these compds. was determined using amino acid anal., ^{13}C -NMR, and site-specific enzymic digestion. These compds. are poly(γ -**glutamylcysteinyl**)glycines. Greater than 80% of the cellular Cd is bound to the bis and tris forms in Cd-resistant cells. There is a direct correlation between the maximum **accumulation** of the **metal-binding** polypeptides and the concentration of toxic ions to which the cells are resistant. In the presence of metal ions, the . . . The presence of γ -carboxamide linkages between glutamyl and adjacent cysteinyl residues indicates that these polypeptides are products of biosynthetic pathways. Poly(γ - **glutamylcysteinyl**)glycines bind metals and, in this respect, appear to be functional analogs of the protein metallothionein. However, in the absence of supraoptimal concns. of trace metal ions, the functions of metallothionein in animals and microorganisms and poly(γ - **glutamylcysteinyl**)glycines in plants may differ.

IT *Datura innoxia*
(poly(**glutamylcysteinyl**)glycine formation in, copper and cadmium toxicity resistance in relation to)

IT 112480-84-9
RL: FORM (Formation, nonpreparative)
(formation of, by *Datura innoxia* cells, copper and cadmium toxicity resistance in relation to)

IT 7440-43-9, Cadmium, biological studies 7440-50-8, biological studies
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
(toxicity of, to *Datura innoxia* cells, poly(**glutamylcysteinyl**)glycine formation in relation to)

L7 ANSWER 5 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

TI **Accumulation** of non-protein **metal-binding** polypeptides
(γ -glutamyl-cysteinyl)n-glycine in selected cadmium-resistant **tomato** cells

AB **Tomato** cell suspensions were selected for sustained growth on normally lethal concns. of CdCl_2 . In Cd-resistant (CdR) cells, Cd^{2+} is found. . . these peptides for the CdR phenotype is demonstrated by

inhibition of their accumulation by buthionine sulfoximine, a specific inhibitor of γ - **glutamylcysteine** synthetase [9023-64-7]. Treatment of CdR cells with a concentration of buthionine sulfoximine below that inhibiting growth in the absence of.

ST cadmium resistance **tomato glutamylcysteinyglycine**

IT **Tomato**

(cadmium toxicity to, resistance to, (**glutamylcysteiny**
)glycine in relation to)

IT 9023-64-7 86220-45-3 99465-98-2

RL: BIOL (Biological study)

(**tomato** resistance to cadmium toxicity in relation to)

IT 7440-43-9, biological studies

RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)

(toxicity of, to **tomato**, resistance to, (
glutamylcysteiny)glycine in relation to)

L7 ANSWER 6 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

AB. . . cell extracts of this material by gel permeation HPLC revealed the presence of complexes with a similar retention time to poly(γ -**glutamylcysteiny**)glycine metal complexes extracted from cell suspension cultures of **Datura innoxia**. However, the peaks corresponding to metal associated with these complexes in HPLC profiles of extracts from *Rhynchosostegium* were low, . . . and Cd in *Rhynchosostegium* from contaminated sites which were bound by these complexes, expressed as a percentage of the total **metal accumulated** by the moss, ranged from 0.06 to 0.65% for Cu and 0.24 to 2.08% for Cd.

IT Miscellaneous Descriptors

DATURA-INOXIA HEAVY METAL ACCUMULATION

LIGAND BINDING **METAL** TOLERANCE MECHANISM POTENTIAL TOXICITY

WATER CONTAMINATION BIOMONITOR

L7 ANSWER 7 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

TI POLY-GAMMA **GLUTAMYL CYSTEINYL GLYCINE** ITS ROLE IN CADMIUM
RESISTANCE IN PLANT CELLS.

AB. . . grow in the presence of normally toxic concentrations of certain trace metal ions. Addition of Cd and Cu to Cd-resistant **Datura innoxia** cell cultures results in the rapid synthesis and **accumulation** of sulfur-rich, **metal-binding** polypeptides. The structure of these compounds was determined using amino acid analysis, ¹³C NMR, and site-specific enzymic digestion. These compounds are poly(γ - **glutamylcysteiny**)glycines. Greater than 80% of the cellular Cd is bound to the bis and tris forms in Cd-resistant cells. There is a direct correlation between the maximum **accumulation** of the **metal-binding** polypeptides and the concentration of toxic ions to which the cells are resistant. In the presence of metal ions, the. . . The presence of γ -carboxamide linkages between glutamyl and adjacent cysteinyl residues indicates that these polypeptides are products of biosynthetic pathways. Poly(γ - **glutamylcysteiny**)glycines bind metals and, in this respect, appear to be functional analogs of the protein metallothionein. However, in the absence of supraoptimal concentrations of trace metal ions, the functions of metallothionein in animals and microorganisms and poly(γ -**glutamylcysteiny**)glycines in plants may differ.

IT Miscellaneous Descriptors

DATURA-INOXIA MICROORGANISM ANIMAL METALLOTHIONEIN CARBON-13

NMR SPECTROSCOPY COPPER HEAVY METAL TOXICITY AMINO ACID ANALYSIS

L7 ANSWER 8 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

TI **ACCUMULATION OF NON-PROTEIN METAL-BINDING POLYPEPTIDES**
GAMMA GLUTAMYL CYSTEINYL-N-GLYCINE IN SELECTED CADMIUM-RESISTANT
TOMATO CELLS.

AB **Tomato** cell suspensions have been selected for sustained growth on normally lethal concentrations of CdCl₂. In cadmium-resistant (CdR) cells, CD2+ is. . . these peptides for the CeR phenotype is demonstrated by inhibition of their accumulation by buthionine sulfoximine, a specific inhibitor of γ - **glutamylcysteine** synthetase. Treatment of CdR cells with a concentration of buthionine sulfoximine below that inhibiting growth in the absence of Cd2+.

IT Miscellaneous Descriptors
 BUTIONINE SULFOXIMINE GAMMA **GLUTAMYL**CYSTEINE SYNTHETASE
 INHIBITOR SEQUENCE LINKAGE ANALYSIS TOXICITY TOLERANCE

RN 7440-43-9 (CADMIUM).
 5072-26-4 (BUTIONINE SULFOXIMINE)
 9023-64-7 (GAMMA-**GLUTAMYL**CYSTEINE SYNTHETASE)

L7 ANSWER 9 OF 46 MEDLINE on STN

TI Poly(gamma-**glutamyl**cysteinyl)glycine: its role in cadmium resistance in plant cells.

AB . . . grow in the presence of normally toxic concentrations of certain trace metal ions. Addition of Cd and Cu to Cd-resistant **Datura innoxia** cell cultures results in the rapid synthesis and **accumulation** of sulfur-rich, **metal**-binding polypeptides. The structure of these compounds was determined using amino acid analysis, ¹³C NMR, and site-specific enzymic digestion. These compounds are poly(gamma-**glutamyl**cysteinyl)glycines. Greater than 80% of the cellular Cd is bound to the bis and tris forms in Cd-resistant cells. There is a direct correlation between the maximum **accumulation** of the **metal**-binding polypeptides and the concentration of toxic ions to which the cells are resistant. In the presence of metal ions, the. . . The presence of gamma-carboxamide linkages between glutamyl and adjacent cysteinyl residues indicates that these polypeptides are products of biosynthetic pathways. Poly(gamma-**glutamyl**cysteinyl)glycines bind metals and, in this respect, appear to be functional analogs of the protein metallothionein. However, in the absence of supraoptimal concentrations of trace metal ions, the functions of metallothionein in animals and microorganisms and poly(gamma-**glutamyl**cysteinyl)glycines in plants may differ.

RN 112480-84-9 (poly(gamma-**glutamyl**cysteinyl)glycine); 7440-43-9 (Cadmium)

L7 ANSWER 10 OF 46 MEDLINE on STN

TI **Accumulation** of non-protein **metal**-binding polypeptides (gamma-glutamyl-cysteinyl)n-glycine in selected cadmium-resistant **tomato** cells.

AB **Tomato** cell suspensions have been selected for sustained growth on normally lethal concentrations of CdCl₂. In cadmium-resistant (CdR) cells, Cd²⁺ is. . . these peptides for the CdR phenotype is demonstrated by inhibition of their accumulation by buthionine sulfoximine, a specific inhibitor of gamma-**glutamyl**cysteine synthetase. Treatment of CdR cells with a concentration of buthionine sulfoximine below that inhibiting growth in the absence of Cd²⁺.

=> d 17 1-10

L7 ANSWER 1 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

AN 2000:44231 CAPLUS

DN 132:149077

TI Transgenic plants capable of accumulating copper and cadmium

AU Galkin, A. P.; Vasiliev, A. N.; Yefimenko, I. M.; Bulko, O. V.; Leoshina, L. G.; Gazaryan, K. G.; Galkina, L. A.

CS Institute of Bioorganic Chemistry & Petrochemistry, Kiev, 252034, Ukraine

SO Warsaw '98, International Symposium and Exhibition on Environmental Contamination in Central and Eastern Europe, Symposium Proceedings, 4th, Warsaw, Sept. 15-17, 1998 (1998), 87-90 Publisher: Institute for International Cooperative Environmental Research, Florida State University, Tallahassee, Fla.
 CODEN: 68LXAI

DT Conference; (computer optical disk)

LA English

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 2 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN

AN 1997:455488 CAPLUS

DN 127:85355

TI Clean-up of contaminated lands from heavy metals using transgenic plants
 AU Galkin, A. P.; Bulko, O. V.; Leoshina, L. G.; Vasiliev, A. N.; Medvedeva, T. V.
 CS Institute of Bioorganic Chemistry and Petrochemistry, Kiev, Ukraine
 SO In Situ and On-Site Bioremediation, Papers from the International In Situ and On-Site Bioremediation Symposium, 4th, New Orleans, Apr. 28-May 1, 1997 (1997), Volume 3, 325-329 Publisher: Battelle Press, Columbus, Ohio. CODEN: 64SMAQ
 DT Conference
 LA English

L7 ANSWER 3 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1991:672843 CAPLUS
 DN 115:272843
 TI Low molecular weight metal complexes in the freshwater moss *Rhynchostegium riparioides* exposed to elevated concentrations of zinc, copper, cadmium, and lead in the laboratory and field
 AU Jackson, P. P.; Robinson, N. J.; Whitton, B. A.
 CS Dep. Biol. Sci., Univ. Durham, Durham, DH1 3LE, UK
 SO Environmental and Experimental Botany (1991), 31(3), 359-66
 CODEN: EEBODM; ISSN: 0098-8472
 DT Journal
 LA English

L7 ANSWER 4 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1988:50767 CAPLUS
 DN 108:50767
 TI Poly(γ - glutamylcysteinyl)glycine: its role in cadmium resistance in plant cells
 AU Jackson, Paul J.; Unkefer, Clifford J.; Doolen, Jane A.; Watt, Ken; Robinson, Nigel J.
 CS Life Sci. Div., Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA
 SO Proceedings of the National Academy of Sciences of the United States of America (1987), 84(19), 6619-23
 CODEN: PNASA6; ISSN: 0027-8424
 DT Journal
 LA English

L7 ANSWER 5 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1986:620438 CAPLUS
 DN 105:220438
 TI **Accumulation** of non-protein metal-binding polypeptides (γ -glutamyl-cysteinyl)n-glycine in selected cadmium-resistant tomato cells
 AU Steffens, John C.; Hunt, Donald F.; Williams, Bill G.
 CS Plant Cell Res. Inst., ARCO, Dublin, CA, 94568, USA
 SO Journal of Biological Chemistry (1986), 261(30), 13879-82
 CODEN: JBCHA3; ISSN: 0021-9258
 DT Journal
 LA English

L7 ANSWER 6 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
 AN 1991:459561 BIOSIS
 DN PREV199192104341; BA92:104341
 TI LOW MOLECULAR WEIGHT METAL COMPLEXES IN THE FRESHWATER MOSS RHYNCHOSTEGIUM-RIPARIOIDES EXPOSED TO ELEVATED CONCENTRATIONS OF ZINC COPPER CADMIUM AND LEAD IN THE LABORATORY AND FIELD.
 AU JACKSON P J [Reprint author]; ROBINSON N J; WHITTON B A
 CS DEP BIOL SCI, UNIV DURHAM, DURHAM DH1 3LE, UK
 SO Environmental and Experimental Botany, (1991) Vol. 31, No. 3, pp. 359-366. CODEN: EEBODM. ISSN: 0098-8472.
 DT Article
 FS BA
 LA ENGLISH
 ED Entered STN: 11 Oct 1991
 Last Updated on STN: 11 Oct 1991

L7 ANSWER 7 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN

AN 1988:8809 BIOSIS
DN PREV198885008809; BA85:8809
TI POLY-GAMMA **GLUTAMYL**CYSTEINYLGLYCINE ITS ROLE IN CADMIUM
RESISTANCE IN PLANT CELLS.
AU JACKSON P J [Reprint author]; UNKEFER C J; DOOLEN J A; WATT K; ROBINSON N
J
CS GENET GROUP, LIFE SCI DIV, LOS ALAMOS NATL LAB, LOS ALAMOS, NM 87545, USA
SO Proceedings of the National Academy of Sciences of the United States of
America, (1987) Vol. 84, No. 19, pp. 6619-6623.
CODEN: PNASA6. ISSN: 0027-8424.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 5 Dec 1987
Last Updated on STN: 5 Dec 1987

L7 ANSWER 8 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
AN 1987:48438 BIOSIS
DN PREV198783027784; BA83:27784
TI **ACCUMULATION** OF NON-PROTEIN **METAL**-BINDING POLYPEPTIDES
GAMMA **GLUTAMYL**CYSTEINYL-N-GLYCINE IN SELECTED CADMIUM-RESISTANT
TOMATO CELLS.
AU STEFFENS J C [Reprint author]; HUNT D F; WILLIAMS B G
CS ARCO PLANT CELL RES INST, DUBLIN, CALIF 94568, USA
SO Journal of Biological Chemistry, (1986) Vol. 261, No. 30, pp. 13879-13882.
CODEN: JBCHA3. ISSN: 0021-9258.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 7 Jan 1987
Last Updated on STN: 7 Jan 1987

L7 ANSWER 9 OF 46 MEDLINE on STN
AN 88016144 MEDLINE
DN PubMed ID: 3477793
TI Poly(gamma-**glutamylcysteiny**l)glycine: its role in cadmium
resistance in plant cells.
AU Jackson P J; Unkefer C J; Doolen J A; Watt K; Robinson N J
CS Life Sciences Division, Los Alamos National Laboratory, NM 87545.
NC IP41 RR02231 (NCRR)
SO Proceedings of the National Academy of Sciences of the United States of
America, (1987 Oct) 84 (19) 6619-23.
Journal code: 7505876. ISSN: 0027-8424.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198711
ED Entered STN: 19900305
Last Updated on STN: 19970203
Entered Medline: 19871104

L7 ANSWER 10 OF 46 MEDLINE on STN
AN 87033557 MEDLINE
DN PubMed ID: 3771509
TI **Accumulation** of non-protein **metal**-binding polypeptides
(gamma-glutamyl-cysteinyl)n-glycine in selected cadmium-resistant
tomato cells.
AU Steffens J C; Hunt D F; Williams B G
SO Journal of biological chemistry, (1986 Oct 25) 261 (30) 13879-82.
Journal code: 2985121R. ISSN: 0021-9258.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198612
ED Entered STN: 19900302
Last Updated on STN: 19970203

=> d 17 1-46

L7 ANSWER 1 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 2000:44231 CAPLUS
 DN 132:149077
 TI Transgenic plants capable of accumulating copper and cadmium
 AU Galkin, A. P.; Vasiliev, A. N.; Yefimenko, I. M.; Bulko, O. V.; Leoshina, L. G.; Gazaryan, K. G.; Galkina, L. A.
 CS Institute of Bioorganic Chemistry & Petrochemistry, Kiev, 252034, Ukraine
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L7 ANSWER 2 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1997:455488 CAPLUS
 DN 127:85355
 TI Clean-up of contaminated lands from heavy metals using transgenic plants
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 CS Institute of Bioorganic Chemistry and Petrochemistry, Kiev, Ukraine
 SO In Situ and On-Site Bioremediation, Papers from the International In Situ and On-Site Bioremediation Symposium, 4th, New Orleans, Apr. 28-May 1, 1997 (1997), Volume 3, 325-329 Publisher: Battelle Press, Columbus, Ohio.
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L7 ANSWER 3 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
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 TI Low molecular weight metal complexes in the freshwater moss *Rhynchostegium riparioides* exposed to elevated concentrations of zinc, copper, cadmium, and lead in the laboratory and field
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 CS Dep. Biol. Sci., Univ. Durham, Durham, DH1 3LE, UK
 SO Environmental and Experimental Botany (1991), 31(3), 359-66
 CODEN: EEBODM; ISSN: 0098-8472
 DT Journal
 LA English

L7 ANSWER 4 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1988:50767 CAPLUS
 DN 108:50767
 TI Poly(γ - glutamylcysteinyl)glycine: its role in cadmium resistance in plant cells
 AU Jackson, Paul J.; Unkefer, Clifford J.; Doolen, Jane A.; Watt, Ken; Robinson, Nigel J.
 CS Life Sci. Div., Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA
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 CODEN: PNASA6; ISSN: 0027-8424
 DT Journal
 LA English

L7 ANSWER 5 OF 46 CAPLUS COPYRIGHT 2005 ACS on STN
 AN 1986:620438 CAPLUS
 DN 105:220438
 TI Accumulation of non-protein metal-binding polypeptides

(γ -glutamyl-cysteinyl)n-glycine in selected cadmium-resistant
tomato cells

AU Steffens, John C.; Hunt, Donald F.; Williams, Bill G.
CS Plant Cell Res. Inst., ARCO, Dublin, CA, 94568, USA
SO Journal of Biological Chemistry (1986), 261(30), 13879-82
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English

L7 ANSWER 6 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
AN 1991:459561 BIOSIS
DN PREV199192104341; BA92:104341
TI LOW MOLECULAR WEIGHT METAL COMPLEXES IN THE FRESHWATER MOSS
RHYNCHOSTEGIUM-RIPARIOIDES EXPOSED TO ELEVATED CONCENTRATIONS OF ZINC
COPPER CADMIUM AND LEAD IN THE LABORATORY AND FIELD.
AU JACKSON P J [Reprint author]; ROBINSON N J; WHITTON B A
CS DEP BIOL SCI, UNIV DURHAM, DURHAM DH1 3LE, UK
SO Environmental and Experimental Botany, (1991) Vol. 31, No. 3, pp. 359-366.
CODEN: EEBODM. ISSN: 0098-8472.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 11 Oct 1991
Last Updated on STN: 11 Oct 1991

L7 ANSWER 7 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
AN 1988:8809 BIOSIS
DN PREV198885008809; BA85:8809
TI POLY-GAMMA **GLUTAMYL**CYSTEINYLGLYCINE ITS ROLE IN CADMIUM
RESISTANCE IN PLANT CELLS.
AU JACKSON P J [Reprint author]; UNKEFER C J; DOOLEN J A; WATT K; ROBINSON N
J
CS GENET GROUP, LIFE SCI DIV, LOS ALAMOS NATL LAB, LOS ALAMOS, NM 87545, USA
SO Proceedings of the National Academy of Sciences of the United States of
America, (1987) Vol. 84, No. 19, pp. 6619-6623.
CODEN: PNASA6. ISSN: 0027-8424.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 5 Dec 1987
Last Updated on STN: 5 Dec 1987

L7 ANSWER 8 OF 46 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
AN 1987:48438 BIOSIS
DN PREV198783027784; BA83:27784
TI **ACCUMULATION** OF NON-PROTEIN **METAL**-BINDING POLYPEPTIDES
GAMMA **GLUTAMYL**CYSTEINYL-N-GLYCINE IN SELECTED CADMIUM-RESISTANT
TOMATO CELLS.
AU STEFFENS J C [Reprint author]; HUNT D F; WILLIAMS B G
CS ARCO PLANT CELL RES INST, DUBLIN, CALIF 94568, USA
SO Journal of Biological Chemistry, (1986) Vol. 261, No. 30, pp. 13879-13882.
CODEN: JBCHA3. ISSN: 0021-9258.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 7 Jan 1987
Last Updated on STN: 7 Jan 1987

L7 ANSWER 9 OF 46 MEDLINE on STN
AN 88016144 MEDLINE
DN PubMed ID: 3477793
TI Poly(gamma-**glutamylcysteinyl**)glycine: its role in cadmium
resistance in plant cells.
AU Jackson P J; Unkefer C J; Doolen J A; Watt K; Robinson N J
CS Life Sciences Division, Los Alamos National Laboratory, NM 87545.
NC IP41 RR02231 (NCRR)
SO Proceedings of the National Academy of Sciences of the United States of
America, (1987 Oct) 84 (19) 6619-23.

Journal code: 7505876. ISSN: 0027-8424.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198711
ED Entered STN: 19900305
Last Updated on STN: 19970203
Entered Medline: 19871104

L7 ANSWER 10 OF 46 MEDLINE on STN
AN 87033557 MEDLINE
DN PubMed ID: 3771509
TI **Accumulation** of non-protein **metal**-binding polypeptides
(gamma-glutamyl-cysteinyl)n-glycine in selected cadmium-resistant
tomato cells.
AU Steffens J C; Hunt D F; Williams B G
SO Journal of biological chemistry, (1986 Oct 25) 261 (30) 13879-82.
Journal code: 2985121R. ISSN: 0021-9258.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198612
ED Entered STN: 19900302
Last Updated on STN: 19970203
Entered Medline: 19861201

L7 ANSWER 11 OF 46 EPFULL COPYRIGHT 2005 EPO/FIZ KA on STN
AN .1996:55548 EPFULL
DUPD 19991020 DUPW 199942
TIEN **Nucleic** acid sequences encoding citrate transporter proteins.
TIFR Sequences d'acides nucleiques codant pour des proteines transporteuses
de citrate.
TIDE Nukleinsaeuresequenzen die fuer Citrat-Transporterproteine Kodieren.
IN Konings, Wilhelmus Nicolaas, Rijksstraatweg 236, 9752 CJ Haren, NL;
Boorsma, Andries, Lage der A 12-11, 9718 BJ Groningen, NL;
Lolkema, Julius Sjiewuke, Hortuslaan 22, 9751 BH Laren, NL
PA Rijksuniversiteit te Groningen, (Groningen, Rijksuniversiteit te),
Broerstraat 5, 9712 CP Groningen, NL
PAN 406260
AG Smulders, Theodorus A.H.J., Ir., et al, Verenigde Octrooibureaux Nieuwe
Parklaan 97, 2587 BN 's-Gravenhage, NL
AGN 21191
LAF English
LA English
LAP English
TL German; English; French
DT Patent
PIT EPA1 Application published with search report
PI EP 839909 A1 19980506
AI EP 1996-203015 A 19961029
PRAI EP 1996-203015 A 19961029 *
IC.VER 6
ICM C12N015-31
ICS C07K014-32; C12N001-21; C22B003-18
ICI C12N001-21, C12R001:19

L7 ANSWER 12 OF 46 EPFULL COPYRIGHT 2005 EPO/FIZ KA on STN
AN 1989:56837 EPFULL
DUPD 19931229 DUPW 199352
TIEN SOLAR AQUATIC METHOD AND APPARATUS FOR TREATING WASTE.
TIFR PROCEDE ET APPAREIL SOLAIRE AQUATIQUE POUR L'EPURATION DES EAUX USEES.
TIDE SONNEN-WASSER-METHODE UND -GERAET ZUM BEHANDELN VON ABWASSER.
IN TODD, John, Henry, 10 Shanks Pond, Falmouth, MA 02540, US;
SILVERSTEIN, Barry, Route 86, Jay, NY 12941, US

PA ECOLOGICAL ENGINEERING ASSOCIATES, (ENGINEERING ASSOCIATES, ECOLOGICAL;
ASSOCIATES, ECOLOGICAL ENGINEERING), 13 Marconi Lane, Marion,
Massachusetts 02738, US

PAN 1239790

AG Fuchs Mehler Weiss, Patentanwaelte Postfach 46 60, 65036 Wiesbaden, DE

AGN 100491

LAF English

LA English

LAP English

TL German; English; French

DT Patent

PIT EPB1 Granted patent

PI EP 442946 B1 19931229
WO 9005118 19900517

DS AT BE CH DE FR GB IT LI LU NL SE

AI EP 1989-912938 A 19891030
WO 1989-US4861 A 19891030

PRAI US 1988-266732 A 19881103

REN PATENT ABSTRACTS OF JAPAN, vol. 9, no. 108 (C-280) [1831], 11 May
1985#;
PATENT ABSTRACTS OF JAPAN, vol. 9, no. 66 (C-271) [1789], 26
March 1985#;
PATENT ABSTRACTS OF JAPAN, vol. 8, no. 246 (C-251) [1683], 10
November 1984#

REP CH 485607 A
DE 3508916 A
US 3770623 A
US 4169050 A
US 4209388 A

IC.VER 6

ICM C02F003-32

L7 ANSWER 13 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN

AN 2001085963 PCTFULL
no bibliographic data available - please use FPI for PI information

L7 ANSWER 14 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN

AN 1999060838 PCTFULL ED 20020515

TIEN ORGANISM AND METHOD FOR METAL RECOVERY, REMEDIATION AND SEPARATION

TIFR ORGANISME ET PROCEDE DE RECUPERATION, REMISE EN ETAT ET SEPARATION DE
METAUX

IN SAYRE, Richard, T.;
TRAINA, Samuel, J.

PA THE OHIO STATE UNIVERSITY RESEARCH FOUNDATION

LA English

DT Patent

PI WO 9960838 A1 19991202

DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR
LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG
SI SK SL TJ TM TR TT UA UG UZ VN YU ZW GH GM KE LS MW SD
SL SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK
ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA
GN GW ML MR NE SN TD TG

AI WO 1999-US12007 A 19990528

PRAI US 1998-60/087,374 19980528

ICM A01B079-00

ICS C12N005-04; A01H005-00

L7 ANSWER 15 OF 46 PCTFULL . COPYRIGHT 2005 Univentio on STN

AN 1999007830 PCTFULL ED 20020515

TIEN TRANSGENIC PLANTS OF ALTERED MORPHOLOGY AND THE ISOLATED i(ARABIDOPSIS
THALIANA) ENDO-1,4-β-GLUCANASE GENE, PROMOTER AND PROTEIN

TIFR PLANTES TRANSGENIQUES A MORPHOLOGIE MODIFIEE ET GENE,
PROMOTEUR ET PROTEINE DE L'ENDO-1,4-β-GLUCANASE ISOLES A PARTIR
D'ARABIDOPSIS THALIANA

IN SHOSEYOV, Oded;
SHANI, Ziv;

SHPIEGL, Etai
 PA YISSUM RESEARCH DEVELOPMENT COMPANY OF THE HEBREW UNIVERSITY OF
 JERUSALEM;
 SHOSEYOV, Oded;
 SHANI, Ziv;
 SHPIEGL, Etai
 LA English
 DT Patent
 PI WO 9907830 A1 19990218
 DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
 FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR
 LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG
 SI SK SL TJ TM TR TT UA UG US UZ VN YU ZW GH GM KE LS MW
 SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK
 ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA
 GN GW ML MR NE SN TD TG
 AI WO 1998-IL345 A 19980726
 PRAI IL 1997-121404 19970727
 US 1998-09/006,632 19980113
 US 1998-09/006,636 19980113
 ICM C12N005-04
 ICS C12N005-14; C12N009-00; C12N009-36; C12N009-42; C12N015-05; C12N015-29;
 C12N015-31; C12N015-63; C12N015-82; A01H005-00; A01H005-10
 L7 ANSWER 16 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1998036084 PCTFULL ED 20020514
 TIEN ENHANCING PLANT GROWTH USING **GENES** ENCODING FOR CARBONIC
 ANHYDRASE, CALCIUM BINDING PROTEIN, METAL BINDING PROTEIN OR
 BIOMINERALIZATION PROTEIN
 TIFR AMELIORATION DE LA CROISSANCE DES VEGETAUX A L'AIDE DE **GENES**
 CODANT POUR UNE ANHYDRASE CARBONIQUE, UNE PROTEINE FIXANT LE CALCIUM,
 UNE PROTEINE FIXANT UN METAL, OU UNE PROTEINE DE BIOMINERALISATION
 IN BASEL, Richard, M.;
 ELION, Glenn, R.
 PA AGRICOLA TECHNOLOGIES, INC.
 LA English
 DT Patent
 PI WO 9836084 A2 19980820
 DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
 FI GB GE GH HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT
 LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK
 SL TJ TM TR TT UA UG UZ VN YU ZW GH GM KE LS MW SD SZ UG
 ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH DE DK ES FI FR GB
 GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE
 SN TD TG
 AI WO 1998-US2501 A 19980206
 PRAI US 1997-8/801,120 19970214
 ICM C12N015-12
 ICS C12N015:60; C12N015:82; A01H005:00
 L7 ANSWER 17 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1998021938 PCTFULL ED 20020514
 TIEN GLUTATHIONE-S-CONJUGATE TRANSPORT IN PLANTS
 TIFR TRANSPORT INDUIT PAR DES CONJUGUES S DE GLUTATHION DANS DES VEGETAUX
 IN REA, Philip, A.;
 LU, Yu-Ping;
 LI, Ze-Sheng
 PA THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA
 LA English
 DT Patent
 PI WO 9821938 A1 19980528
 DS W: AU CA JP AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT
 SE
 AI WO 1997-US21336 A 19971118
 PRAI US 1996-60/031,040 19961118
 US 1997-60/061,328 19971008
 ICM A01H005-00
 ICS C07K014:415; C07K016:16; C12N001:13; C12N001:21; C12N005:10; C12N015:29;

C12N015:64; C12N015:82

L7 ANSWER 18 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1998018929 PCTFULL ED 20020514
TIEN **NUCLEIC** ACID SEQUENCES ENCODING CITRATE TRANSPORTER PROTEINS
TIFR SEQUENCES D'ACIDES NUCLEIQUES CODANT DES PROTEINES TRANSPORTEUSES DE
CITRATE
IN LOLKEMA, Julius, Sjiewuke;
KONINGS, Wilhelmus, Nicolaas;
BOORSMA, Andries
PA RIJKSUNIVERSITEIT TE GRONINGEN;
LOLKEMA, Julius, Sjiewuke;
KONINGS, Wilhelmus, Nicolaas;
BOORSMA, Andries
LA English
DT Patent
PI WO 9818929 A1 19980507
DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
FI GB GE GH HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT
LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK
SL TJ TM TR TT UA UG US UZ VN YU ZW GH KE LS MW SD SZ UG
ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH DE DK ES FI FR GB
GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE
SN TD TG
AI WO 1997-NL594 A 19971029
PRAI AT 1996-96203015.1 19961029
ICM C12N015-31
ICS C07K014:32; C12N015:62; C07K019:00; C12Q001:68; G01N033:60; C12N001:21;
C22B003:18; C12N001:21; C12R001:19

L7 ANSWER 19 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1998008991 PCTFULL ED 20020514
TIEN METHOD FOR PHYTOMINING OF NICKEL, COBALT AND OTHER METALS FROM SOIL
TIFR PROCEDE DE PHYTOEXTRACTION DE NICKEL, COBALT ET AUTRES METAUX PRESENTS
DANS LE SOL
IN CHANEY, Rufus, L.;
ANGLE, Jay, Scott;
LI, Yin-Ming
PA CHANEY, Rufus, L.;
ANGLE, Jay, Scott;
LI, Yin-Ming
LA English
DT Patent
PI WO 9808991 A1 19980305
DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
FI GB GE GH HU IL IS JP KE KG KP KR KZ LC LK LR LS LT LU
LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL
TJ TM TR TT UA UG US UZ VN YU ZW GH KE LS MW SD SZ UG ZW
AM AZ BY KG KZ MD RU TJ TM AT BE CH DE DK ES FI FR GB GR
IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN
TD TG
AI WO 1997-US15109 A 19970829
PRAI US 1996-60/024,928 19960830
US 1996-60/030,462 19961106
ICM C22B023-00

L7 ANSWER 20 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1997045000 PCTFULL ED 20020514
TIEN METAL-REGULATED TRANSPORTERS AND USES THEREFOR
TIFR TRANSPORTEURS REGULES PAR DES METAUX ET LEURS UTILISATIONS
IN EIDE, David, J.;
GUERINOT, Mary, Lou
PA TRUSTEES OF DARTMOUTH COLLEGE;
REGENTS OF THE UNIVERSITY OF MINNESOTA
LA English
DT Patent
PI WO 9745000 A1 19971204
DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CZ DE DK EE ES FI

GB GE HU IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD
 MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK TJ TM TR
 TT UA UG UZ VN KE LS MW SD SZ UG AM AZ BY KG KZ MD RU TJ
 TM AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF
 BJ CF CG CI CM GA GN ML MR NE SN TD TG

AI WO 1996-US19065 A 19961127
 PRAI US 1996-60/018,578 19960529
 CA 1996-2,187,728 19961011
 ICM A01H005-00
 ICS C21B009:00; C12N005:04; C12N015:29; C12N015:82

L7 ANSWER 21 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1995020318 PCTFULL ED 20020514
 TIEN ANCIENT ORGANISMS
 TIFR ORGANISMES ANCIENS
 IN CANO, Raul, J.;
 BORUCKI, Monica, K.
 PA AMBERGENE CORPORATION
 LA English
 DT Patent
 PI WO 9520318 A1 19950803

DS W: AM AU BB BG BR BY CA CN CZ EE FI GE HU JP KE KG KR KZ LK
 LR LT LV MD MG MN MW MX NO NZ PL RO RU SD SI SK TJ TT UA
 UZ VN KE MW SD SZ AT BE CH DE DK ES FR GB GR IE IT LU MC
 NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG

AI WO 1995-US1073 A 19950127
 PRAI US 1994-187,961 19940128
 US 1994-290,319 19940815
 US 1994-330,894 19941028
 ICM A01N003-00
 ICS C08L093:00; C09F001:00; C12N001:00; C12N001:12; C12N001:14; C12N001:16;
 C12N001:18; C12N001:20; C12N005:00; C12N005:02; G01N033:44

L7 ANSWER 22 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1995009629 PCTFULL ED 20020514
 TIEN SYNTHETIC MELANIN
 TIFR MELANINE SYNTHETIQUE
 IN PAWELEK, John, M.
 PA YALE UNIVERSITY
 LA English
 DT Patent
 PI WO 9509629 A1 19950413

DS W: AM AU BB BG BR BY CA CN CZ EE FI GE HU JP KE KG KR KZ LK
 LR LT LV MD MG MN MW NO NZ PL RO RU SD SI SK TJ TT UA UZ
 VN KE MW SD SZ AT BE CH DE DK ES FR GB GR IE IT LU MC NL
 PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG

AI WO 1994-US10835 A 19940926
 PRAI US 1993-131,270 19931001
 ICM A61K031-405
 ICS A61K031:12

L7 ANSWER 23 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
 AN 1994029466 PCTFULL ED 20020513
 TIEN PHYTOREMEDIATION OF METALS
 TIFR PHYRODECONTAMINATION DE SOLS CONTAMINES PAR DES METAUX
 IN RASKIN, Ilya;
 KUMAR, Nanda, P., B., A.;
 DOUCHENKOV, Slavik
 PA PHYTOTECH, INC.
 LA English
 DT Patent
 PI WO 9429466 A1 19941222

DS W: AT AU BR BY CA CN CZ HU JP PL RU SK UA AT BE CH DE DK ES
 FR GB GR IE IT LU MC NL PT SE

AI WO 1994-US6178 A 19940602
 PRAI US 1993-8/073,258 19930604
 US 1994-8/252,234 19940601
 ICM C12N015-82

ICS B09B003:00; A01H005:00

L7 ANSWER 24 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1993021252 PCTFULL ED 20020513
TIEN SYNTHETIC MELANIN
TIFR MELANINE SYNTHETIQUE
IN PAWELEK, John, M.;
OSBER, Michael, P.;
ORLOW, Seth, J.
PA YALE UNIVERSITY;
PAWELEK, John, M.;
OSBER, Michael, P.;
ORLOW, Seth, J.
LA English
DT Patent
PI WO 9321252 A1 19931028
DS W: AT AU BB BG BR CH DE DK FI GB HU JP KP KR KZ LK LU MG MW
NL NO RO RU SD SE US AT BE CH DE DK ES FR GB GR IE IT LU
MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG
AI WO 1993-US3430 A 19930412
PRAI US 1992-7/867,851 19920413
ICM C08G063-06
ICS C08G065:38; A61K031:40; A23L001:275; C09B067:20; C09B067:42

L7 ANSWER 25 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1992016189 PCTFULL ED 20020513
TIEN SOLUBLE MELANIN
TIFR MELANINE SOLUBLE
IN PAWELEK, John, M.;
ORLOW, Seth, J.
PA YALE UNIVERSITY
LA English
DT Patent
PI WO 9216189 A1 19921001
DS W: AT BE CA CH DE DK ES FR GB GR IT JP LU NL SE
AI WO 1991-US3464 A 19910516
PRAI US 1990-603,111 19901025
US 1991-674,489 19910325
ICM A61K007-40
ICS A61K007:42; A61K031:40; A61K031:405; A61K037:50; A61K035:12; A61K035:36

L7 ANSWER 26 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1991003424 PCTFULL ED 20020513
TIEN BIOMINING OF GALLIUM AND GERMANIUM CONTAINING ORES
TIFR EXTRACTION BIOLOGIQUE DE GALLIUM ET DE GERMANIUM CONTENUS DANS DES
MINERAIS
IN BOWERS-IRONS, Gail, L., A.;
PEASE, John, R.;
TRAN, Quynh, K.;
GIBB, Tracy;
PRYOR, Robert, J.;
HADDAD, Sandra
PA TECHNICAL RESEARCH, INC.
LA English
DT Patent
PI WO 9103424 A1 19910321
DS W: AT AU BE CH DE DK ES FR GB IT JP LU NL SE
AI WO 1990-US4977 A 19900831
PRAI US 1989-401,076 19890831
ICM C01G017-00
ICS C01G015:00; C01G009:00; C01G019:00; C01G021:00; C12S003:00; C22B041:00;
C22B058:00; C22B019:00; C22B013:00; C22B025:00

L7 ANSWER 27 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1991000369 PCTFULL ED 20020513
TIEN BIODEGRADATION AND RECOVERY OF GALLIUM AND OTHER METAL FROM INTEGRATED
CIRCUITS
TIFR BIODEGRADATION ET RECUPERATION DU GALLIUM ET D'AUTRES METAUX PROVENANT

DE CIRCUITS INTEGRES
IN BOWERS-IRONS, Gail, L., A.;
PEASE, John, R.
PA TECHNICAL RESEARCH, INC.
LA English
DT Patent
PI WO 9100369 A1 19910110
DS W: AT AU BE CH DE DK ES FR GB IT JP LU NL SE
AI WO 1990-US3667 A 19900627
PRAI US 1989-372,058 19890627
ICM C22B030-04
ICS C22B041:00; C22B058:00; C12S013:00

L7 ANSWER 28 OF 46 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1990005118 PCTFULL ED 20020513
TIEN SOLAR AQUATIC METHOD AND APPARATUS FOR TREATING WASTE
TIFR PROCEDE ET APPAREIL SOLAIRE AQUATIQUE POUR L'EPURATION DES EAUX USEES
IN TODD, John, Henry;
SILVERSTEIN, Barry
PA ECOLOGICAL ENGINEERING ASSOCIATES
LA English
DT Patent
PI WO 9005118 A1 19900517
DS W: AT BE CH DE FR GB IT LU NL SE
AI WO 1989-US4861 A 19891030
PRAI US 1988-266,732 19881103
ICM C02F003-32

L7 ANSWER 29 OF 46 USPATFULL on STN
AN 1999:167132 USPATFULL
TI Arabidopsis thaliana endo-1,4- β -glucanase **gene** and
promoter
IN Shoseyov, Oded, Karme Yosef, Israel
Shani, Ziv, Rehovoth, Israel
PA Yisum Research Development Company of the Hebrew University of
Jerusalem, Israel (non-U.S. corporation)
PI US 6005092 19991221
AI US 1998-6636 19980113 (9)
PRAI IL 1997-121404 19970727
DT Utility
FS Granted
LN.CNT 3268
INCL INCLM: 536/023.600
INCLS: 536/024.100; 800/278.000; 800/290.000; 435/209.000; 435/320.100;
435/419.000; 435/468.000
NCL NCLM: 536/023.600
NCLS: 435/209.000; 435/320.100; 435/419.000; 435/468.000; 536/024.100;
800/278.000; 800/290.000
IC [6]
ICM: C12N005-04
ICS: C12N015-29; C12N015-56; C12N015-82
EXF 536/23.6; 536/24.1; 435/209; 435/298; 435/320.1; 435/419; 435/440;
435/468; 800/276; 800/278; 800/288; 800/290; 800/295; 800/298;
800/DIG.9; 800/52; 800/200; 800/205
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 30 OF 46 USPATFULL on STN
AN 1999:125128 USPATFULL
TI **Nucleic acids encoding metal uptake**
transporters and their uses
IN Schroeder, Julian I., La Jolla, CA, United States
Antosiewicz, Danuta M., Warsaw, Poland
Schachtman, Daniel P., Tranmere, Australia
Clemens, Stephan, San Diego, CA, United States
PA The Regents of the University of California, Oakland, CA, United States
(U.S. corporation)
PI US 5965792 19991012
AI US 1997-900148 19970728 (8)

PRAI US 1996-22722P 19960729 (60)
DT Utility
FS Granted
LN.CNT 1161
INCL INCLM: 800/278.000
INCLS: 435/419.000; 435/320.100; 435/418.000; 435/410.000; 435/069.100;
435/070.100; 435/468.000; 536/023.600; 536/023.100; 800/295.000
NCL NCLM: 800/278.000
NCLS: 435/069.100; 435/070.100; 435/320.100; 435/410.000; 435/418.000;
435/419.000; 435/468.000; 536/023.100; 536/023.600; 800/295.000
IC [6]
ICM: C12N015-29
ICS: C12N015-82; A01H004-00; A01H005-10
EXF 435/69.1; 435/70.1; 435/468; 435/410; 435/419; 435/320.1; 435/418;
536/23.6; 536/23.1; 800/278; 800/295
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 31 OF 46 USPATFULL on STN
AN 1999:84758 USPATFULL
TI Conversion of metal oxidation states by phyto reduction
IN Salt, David E., 231 Montgomery St., Highland Park, NJ, United States
08904
Raskin, Ilya, 48 Alexandria Dr., Manalapan, NJ, United States 07726
Kumar, Nanda P. B. A., 547 Starkey Apartments, New Brunswick, NJ, United
States 08903
Douchenkov, Slavik, 353 Crosspointe Dr., East Brunswick, NJ, United
States 08816
PI US 5928406 19990727
AI US 1994-333143 19941101 (8)
RLI Continuation-in-part of Ser. No. US 1994-252234, filed on 1 Jun 1994
which is a continuation-in-part of Ser. No. US 1993-73258, filed on 4
Jun 1993, now patented, Pat. No. US 5364451, issued on 15 Nov 1994
DT Utility
FS Granted
LN.CNT 1444
INCL INCLM: 075/712.000
INCLS: 210/602.000; 405/128.000; 423/DIG.017; 588/256.000
NCL NCLM: 075/712.000
NCLS: 210/602.000; 405/128.100; 405/128.150; 423/DIG.017; 588/256.000
IC [6]
ICM: C21B003-18
EXF 075/712; 210/602; 405/125; 423/DIG.17; 588/256
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 32 OF 46 USPATFULL on STN
AN 1998:161854 USPATFULL
TI Phytorecovery of metals using seedlings
IN Kapulnik, Yoram, Highland Park, NJ, United States
Ensley, Burt, Newtown, PA, United States
Raskin, Ilya, Manalapan, NJ, United States
PA Phytotech, Inc., Monmouth Junction, NJ, United States (U.S. corporation)
PI US 5853576 19981229
AI US 1997-911655 19970815 (8)
RLI Division of Ser. No. US 1996-602078, filed on 15 Feb 1996, now patented,
Pat. No. US 5728300
DT Utility
FS Granted
LN.CNT 1011
INCL INCLM: 210/150.000
INCLS: 210/170.000; 210/602.000; 210/198.100; 210/251.000; 047/063.000;
047/059.000
NCL NCLM: 210/150.000
NCLS: 047/059.000R; 047/063.000; 210/170.000; 210/198.100; 210/251.000;
210/602.000
IC [6]
ICM: C02F003-32
EXF 047/60; 047/61; 047/63; 047/64; 210/150; 210/151; 210/170; 210/602;
210/747; 210/610; 210/611; 210/620; 210/631; 210/911-913; 210/198.1;

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 33 OF 46 USPATFULL on STN
AN 1998:154133 USPATFULL
TI Metal-regulated transporters and uses therefor
IN Guerinot, Mary Lou, Etna, NH, United States
Eide, David J., Columbia, MS, United States
PA Trustees of Dartmouth College, Hanover, NH, United States (U.S. corporation)
Regents of the University of Minnesota, Minneapolis, MN, United States (U.S. corporation)
PI US 5846821 19981208
AI US 1996-758621 19961127 (8)
PRAI US 1996-18578P 19960529 (60)
DT Utility
FS Granted
LN.CNT 4077
INCL INCLM: 435/320.100
INCLS: 435/006.000; 435/069.100; 435/172.300; 435/325.000; 436/501.000;
536/023.100; 536/024.100; 536/024.300; 536/024.310; 536/024.320;
536/024.330; 935/077.000; 935/078.000
NCL NCLM: 435/320.100
NCLS: 435/006.000; 435/069.100; 435/325.000; 436/501.000; 536/023.100;
536/024.100; 536/024.300; 536/024.310; 536/024.320; 536/024.330
IC [6]
ICM: C07H021-04
EXF 435/6; 435/69.1; 435/172.3; 435/320.1; 435/325; 436/501; 536/23.1;
536/24.1; 536/24.3-24.33; 935/77; 935/78

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 34 OF 46 USPATFULL on STN
AN 1998:114046 USPATFULL
TI Microbial isolates promote phytoremediation
IN Chet, Ilan, Nes Ziona, Israel
Salt, David, Highland Park, NJ, United States
Blaylock, Michael, Dayton, NJ, United States
Raskin, Ilya, Manalapan, NJ, United States
PA Rutgers, The State University of New Jersey, New Brunswick, NJ, United States (U.S. corporation)
PI US 5809693 19980922
AI US 4212096 19950413 (8)
DT Utility
FS Granted
LN.CNT 1163
INCL INCLM: 047/058.000
INCLS: 047/001.400; 210/600.000; 210/601.000; 210/602.000; 435/262.000;
405/113.000; 405/117.000; 424/093.400; 424/093.460; 424/093.461;
424/093.462; 424/093.470
NCL NCLM: 047/058.100R
NCLS: 047/001.400; 210/600.000; 210/601.000; 210/602.000
IC [6]
ICM: A01B079-00
ICS: A01C000-00; A01G007-00; A01H013-00; B01D000-00; C20F000-00;
C20F003-00; C20F003-32; C07C000-00; C07D000-00; C07J000-00; C07K000-00;
E02B007-08; E02B007-06; A01N063-00; A01N065-00; A61K048-00; C07F000-00;
C07H000-00
EXF 047/1.4; 047/58; 210/600; 210/601; 210/602; 435/262; 405/113; 405/117;
424/93.1; 424/93.2; 424/93.461; 424/93.462; 424/93.47; 424/93.48;
424/93.5; 424/93.7; 424/93.46; 424/93.4

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 35 OF 46 USPATFULL on STN
AN 1998:88246 USPATFULL
TI Phytoremediation of metals
IN Raskin, Ilya, 48 Alexandria Dr., Manalapan, NJ, United States 07726
Kumar, Nanda P. B. A., 547 Starkey Apartments, New Brunswick, NJ, United States 08903

Douchenkov, Slavik, 353 Crosspointe Dr., East Brunswick, NJ, United States 08816

PI US 5785735 19980728
AI US 1994-252234 19940601 (8)
RLI Continuation-in-part of Ser. No. US 1993-73258, filed on 4 Jun 1993, now patented, Pat. No. US 5364451
DT Utility
FS Granted
LN.CNT 1149
INCL INCLM: 075/711.000
INCLS: 210/602.000; 075/712.000
NCL NCLM: 075/711.000
NCLS: 075/712.000; 210/602.000
IC [6]
ICM: C22B003-24
EXF 075/710; 075/711; 071/DIG.2; 071/99; 071/903; 210/602
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 36 OF 46 USPATFULL on STN
AN 1998:27685 USPATFULL
TI Phytorecovery of metals using seedlings
IN Kapulnik, Yoram, Highland Park, NJ, United States
Ensley, Burt, Newtown, PA, United States
Raskin, Ilya, Manalapan, NJ, United States
PA Phytotech, Inc., Monmouth Junction, NJ, United States (U.S. corporation)
PI US 5728300 19980317
AI US 1996-602078 19960215 (8)
DT Utility
FS Granted
LN.CNT 1035
INCL INCLM: 210/602.000
INCLS: 210/620.000; 210/911.000
NCL NCLM: 210/602.000
NCLS: 210/620.000; 210/911.000
IC [6]
ICM: C02F003-32
EXF 210/602; 210/747; 210/610; 210/611; 210/620; 210/631; 210/911-913
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 37 OF 46 USPATFULL on STN
AN 97:29185 USPATFULL
TI Soluble melanin
IN Pawelek, John M., Hamden, CT, United States
Orlow, Seth J., Long Island City, NY, United States
PA Yale University, New Haven, CT, United States (U.S. corporation)
PI US 5618519 19970408
AI US 1993-16348 19930211 (8)
RLI Division of Ser. No. US 1990-603111, filed on 25 Oct 1990, now patented, Pat. No. US 5218079 which is a continuation-in-part of Ser. No. US 1990-525944, filed on 18 May 1990, now patented, Pat. No. US 5216116
DT Utility
FS Granted
LN.CNT 675
INCL INCLM: 424/059.000
INCLS: 424/060.000; 514/937.000; 514/938.000; 514/939.000; 514/969.000
NCL NCLM: 424/059.000
NCLS: 424/060.000; 514/937.000; 514/938.000; 514/939.000; 514/969.000
IC [6]
ICM: A61K007-42
ICS: A61K007-40; A61K009-06
EXF 424/60; 424/59
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 38 OF 46 USPATFULL on STN
AN 97:3732 USPATFULL
TI Ancient microorganisms
IN Cano, Raul J., San Luis Obispo, CA, United States
Borucki, Monica K., Laporte, CO, United States

PA Ambergene Corporation, San Francisco, CA, United States (U.S. corporation)
PI US 5593883 19970114
AI US 1994-330894 19941028 (8)
RLI Continuation-in-part of Ser. No. US 1994-290319, filed on 15 Aug 1994, now abandoned which is a continuation of Ser. No. US 1994-187961, filed on 28 Jan 1994, now abandoned
DT Utility
FS Granted
LN.CNT 1887
INCL INCLM: 435/252.100
INCLS: 424/093.100; 424/093.400; 424/093.410; 424/093.430; 424/093.460; 424/419.000; 435/240.100; 435/252.500; 435/252.310; 435/252.340; 435/255.100; 435/255.200; 435/255.210
NCL NCLM: 435/252.100
NCLS: 424/093.100; 424/093.400; 424/093.410; 424/093.430; 424/093.460; 424/419.000; 435/252.310; 435/252.340; 435/252.500; 435/255.100; 435/255.200; 435/255.210; 435/325.000; 435/348.000; 435/378.000
IC [6]
ICM: C12N001-20
ICS: C12N005-00
EXF 424/93.1; 424/93.4; 424/419; 424/93.41; 424/93.43; 424/93.46; 435/240.1; 435/252.5; 435/252.1; 435/252.31; 435/252.34; 435/252.35; 435/252.7; 435/253.5; 435/253.6; 435/254.1; 435/254.2; 435/255.1; 435/255.2; 435/255.21
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 39 OF 46 USPATFULL on STN
AN 95:13495 USPATFULL
TI Method for treating water
IN Todd, John H., Falmouth, MA, United States
Silverstein, Barry, Jay, NY, United States
PA Ecological Engineering Associates, Marion, MA, United States (U.S. corporation)
PI US 5389257 19950214
AI US 1991-789075 19911107 (7)
RLI Division of Ser. No. US 1988-266732, filed on 3 Nov 1988, now patented, Pat. No. US 5087353
DT Utility
FS Granted
LN.CNT 1098
INCL INCLM: 210/602.000
INCLS: 210/621.000; 210/747.000
NCL NCLM: 210/602.000
NCLS: 210/621.000; 210/747.000
IC [6]
ICM: C02F003-32
EXF 210/602; 210/630; 210/620-623; 210/747; 210/94; 210/150; 210/151; 210/170

L7 ANSWER 40 OF 46 USPATFULL on STN
AN 95:7682 USPATFULL
TI Synthetic melanin as a sunscreen and tanning agent
IN Pawelek, John, Hamden, CT, United States
Osber, Michael P., Hamden, CT, United States
Orlow, Seth J., Long Island City, NY, United States
PA Yale University, New Haven, CT, United States (U.S. corporation)
PI US 5384116 19950124
AI US 1993-16418 19930325 (8)
RLI Division of Ser. No. US 1992-867851, filed on 13 Apr 1992, now patented, Pat. No. US 5227459 which is a continuation-in-part of Ser. No. US 1991-674489, filed on 25 Mar 1991, now patented, Pat. No. US 5225435 which is a continuation of Ser. No. US 1990-603111, filed on 25 Oct 1990, now patented, Pat. No. US 5218079 which is a continuation of Ser. No. US 1990-525944, filed on 18 May 1990, now patented, Pat. No. US 5216116
DT Utility
FS Granted

LN.CNT 698
INCL INCLM: 424/063.000
INCLS: 424/059.000; 424/078.030; 514/415.000
NCL NCLM: 424/063.000
NCLS: 424/059.000; 424/078.030; 514/415.000
IC [6]
ICM: C08G063-06
EXF 424/59; 424/63; 424/78.03; 514/415
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 41 OF 46 USPATFULL on STN
AN 93:57001 USPATFULL
TI Synthetic melanin
IN Pawelek, John, Hamden, CT, United States
Osber, Michael P., Hamden, CT, United States
Orlow, Seth J., Long Island City, NY, United States
PA Yale University, New Haven, CT, United States (U.S. corporation)
PI US 5227459 19930713
AI US 1992-867851 19920413 (7)
RLI Continuation-in-part of Ser. No. US 1991-674489, filed on 25 Mar 1991
which is a continuation of Ser. No. US 1990-603111, filed on 25 Oct 1990
which is a continuation of Ser. No. US 1990-525944, filed on 18 May 1990
DT Utility
FS Granted
LN.CNT 560
INCL INCLM: 528/206.000
INCLS: 424/059.000; 424/063.000
NCL NCLM: 528/206.000
NCLS: 424/059.000; 424/063.000
IC [5]
ICM: C08G063-06
ICS: C08G065-38
EXF 528/206; 424/59; 424/63
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 42 OF 46 USPATFULL on STN
AN 93:54749 USPATFULL
TI Soluble melanin
IN Pawelek, John M., Hamden, CT, United States
Orlow, Seth J., Long Island City, NY, United States
PA Yale University, New Haven, CT, United States (U.S. corporation)
PI US 5225435 19930706
AI US 1991-674489 19910325 (7)
RLI Continuation-in-part of Ser. No. US 1990-603111, filed on 25 Oct 1990
which is a continuation-in-part of Ser. No. US 1990-525944, filed on 18
May 1990
DT Utility
FS Granted
LN.CNT 706
INCL INCLM: 514/415.000
INCLS: 424/059.000; 424/063.000
NCL NCLM: 514/415.000
NCLS: 424/059.000; 424/063.000
IC [5]
ICM: A61K031-405
EXF 424/59; 424/63; 514/415
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 43 OF 46 USPATFULL on STN
AN 93:46524 USPATFULL
TI Soluble melanin
IN Pawelek, John M., Hamden, CT, United States
Orlow, Seth J., Long Island City, NY, United States
PA Yale University, New Haven, CT, United States (U.S. corporation)
PI US 5218079 19930608
AI US 1990-603111 19901025 (7)
RLI Continuation-in-part of Ser. No. US 1990-525944, filed on 18 May 1990
DT Utility

FS Granted
LN.CNT 646
INCL INCLM: 528/206.000
INCLS: 435/041.000; 424/059.000; 424/063.000
NCL NCLM: 528/206.000
NCLS: 424/059.000; 424/063.000; 435/041.000
IC [5]
ICM: C08G063-06
EXF 424/59; 424/63; 528/206; 435/41
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 44 OF 46 USPATFULL on STN
AN 92:10598 USPATFULL
TI Solar aquatic apparatus for treating waste
IN Todd, John H., Falmouth, MA, United States
Silverstein, Barry, New York, NY, United States
PA Ecological Engineering Associates, Marion, MA, United States (U.S.
corporation)
PI US 5087353 19920211
AI US 1988-266732 19881103 (7)
DT Utility
FS Granted
LN.CNT 1060
INCL INCLM: 210/094.000
INCLS: 210/151.000; 210/170.000; 210/195.100
NCL NCLM: 210/094.000
NCLS: 210/151.000; 210/170.000; 210/195.100
IC [5]
ICM: C02F003-32
EXF 210/602; 210/170; 210/94; 210/195.1; 210/195.3; 210/747; 210/150;
210/151

L7 ANSWER 45 OF 46 USPATFULL on STN
AN 91:54565 USPATFULL
TI Biomining of gallium and germanium containing ores
IN Bowers-Irons, Gail L. A., Salt Lake City, UT, United States
Pease, John R., Kearns, UT, United States
Tran, Quynh K., Salt Lake City, UT, United States
Gibb, Tracy, Salt Lake City, UT, United States
Pryor, Robert J., Salt Lake City, UT, United States
Haddad, Sandra, Centerville, UT, United States
PA Technical Research, Inc., Salt Lake City, UT, United States (U.S.
corporation)
PI US 5030426 19910709
AI US 1989-401076 19890831 (7)
RLI Continuation-in-part of Ser. No. US 1989-372058, filed on 27 Jun 1989
DT Utility
FS Granted
LN.CNT 857
INCL INCLM: 423/098.000
INCLS: 423/109.000; 423/131.000; 423/DIG.017; 435/262.000
NCL NCLM: 423/098.000
NCLS: 423/109.000; 423/131.000; 423/DIG.017; 435/262.000
IC [5]
ICM: C22B013-00
ICS: C22B025-00; C22B041-00; C22B058-00
EXF 423/131; 423/98; 423/109; 423/DIG.17; 075/101R; 075/121; 075/743;
435/262
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L7 ANSWER 46 OF 46 USPATFULL on STN
AN 91:54564 USPATFULL
TI Biodegradation and recovery of gallium and other metals from integrated
circuits
IN Bowers-Irons, Gail L. A., Salt Lake City, UT, United States
Pease, John R., Kearns, UT, United States
PA Technical Research, Inc., Salt Lake City, UT, United States (U.S.
corporation)

PI US 5030425 19910709
AI US 1989-372058 19890627 (7)
DT Utility
FS Granted
LN.CNT 676
INCL INCLM: 423/087.000
INCLS: 423/098.000; 423/109.000; 423/131.000; 435/262.000
NCL NCLM: 423/087.000
NCLS: 423/098.000; 423/109.000; 423/131.000; 435/262.000
IC [5]
ICM: C22B030-04
ICS: C22B013-00; C22B025-00; C22B041-00
EXF 423/131; 423/DIG.17; 423/98; 423/87; 423/109; 075/101R; 075/121;
075/743; 435/262
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> s 17 and (ECS or phytochelatin or gamma glutamylcysteine)

21 FILES SEARCHED...

L8 7 L7 AND (ECS OR PHYTOCHELATIN OR GAMMA GLUTAMYL-CYSTEINE)

=> d 18 1-7

L8 ANSWER 1 OF 7 CAPLUS COPYRIGHT 2005 ACS on STN
AN 1986:620438 CAPLUS
DN 105:220438
TI **Accumulation** of non-protein **metal**-binding polypeptides
(γ -glutamyl-cysteinyl)n-glycine in selected cadmium-resistant
tomato cells
AU Steffens, John C.; Hunt, Donald F.; Williams, Bill G.
CS Plant Cell Res. Inst., ARCO, Dublin, CA, 94568, USA
SO Journal of Biological Chemistry (1986), 261(30), 13879-82
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English

L8 ANSWER 2 OF 7 BIOSIS COPYRIGHT (c) 2005 The Thomson Corporation on STN
AN 1987:48438 BIOSIS
DN PREV198783027784; BA83:27784
TI **ACCUMULATION OF NON-PROTEIN METAL-BINDING POLYPEPTIDES**
GAMMA GLUTAMYL-CYSTEINYL-N-GLYCINE IN SELECTED CADMIUM-RESISTANT
TOMATO CELLS.
AU STEFFENS J C [Reprint author]; HUNT D F; WILLIAMS B G
CS ARCO PLANT CELL RES INST, DUBLIN, CALIF 94568, USA
SO Journal of Biological Chemistry, (1986) Vol. 261, No. 30, pp. 13879-13882.
CODEN: JBCHA3. ISSN: 0021-9258.
DT Article
FS BA
LA ENGLISH
ED Entered STN: 7 Jan 1987
Last Updated on STN: 7 Jan 1987

L8 ANSWER 3 OF 7 MEDLINE on STN
AN 87033557 MEDLINE
DN PubMed ID: 3771509
TI **Accumulation** of non-protein **metal**-binding polypeptides
(gamma-glutamyl-cysteinyl)n-glycine in selected cadmium-resistant
tomato cells.
AU Steffens J C; Hunt D F; Williams B G
SO Journal of biological chemistry, (1986 Oct 25) 261 (30) 13879-82.
Journal code: 2985121R. ISSN: 0021-9258.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198612
ED Entered STN: 19900302
Last Updated on STN: 19970203

Entered Medline: 19861201

L8 ANSWER 4 OF 7 PCTFULL COPYRIGHT 2005 Univentio on STN
AN 1999060838 PCTFULL ED 20020515
TIEN ORGANISM AND METHOD FOR METAL RECOVERY, REMEDIATION AND SEPARATION
TIFR ORGANISME ET PROCEDE DE RECUPERATION, REMISE EN ETAT ET SEPARATION DE
METAUX
IN SAYRE, Richard, T.;
TRAINA, Samuel, J.
PA THE OHIO STATE UNIVERSITY RESEARCH FOUNDATION
LA English
DT Patent
PI WO 9960838 A1 19991202
DS W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES
FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR
LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG
SI SK SL TJ TM TR TT UA UG UZ VN YU ZW GH GM KE LS MW SD
SL SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK
ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA
GN GW ML MR NE SN TD TG
AI WO 1999-US12007 A 19990528
PRAI US 1998-60/087,374 19980528
ICM A01B079-00
ICS C12N005-04; A01H005-00

L8 ANSWER 5 OF 7 USPATFULL on STN
AN 1999:125128 USPATFULL
TI **Nucleic acids encoding metal uptake**
transporters and their uses
IN Schroeder, Julian I., La Jolla, CA, United States
Antosiewicz, Danuta M., Warsaw, Poland
Schachtman, Daniel P., Tramere, Australia
Clemens, Stephan, San Diego, CA, United States
PA The Regents of the University of California, Oakland, CA, United States
(U.S. corporation)
PI US 5965792 19991012
AI US 1997-900148 19970728 (8)
PRAI US 1996-22722P 19960729 (60)
DT Utility
FS Granted
LN.CNT 1161
INCL INCLM: 800/278.000
INCLS: 435/419.000; 435/320.100; 435/418.000; 435/410.000; 435/069.100;
435/070.100; 435/468.000; 536/023.600; 536/023.100; 800/295.000
NCL NCLM: 800/278.000
NCLS: 435/069.100; 435/070.100; 435/320.100; 435/410.000; 435/418.000;
435/419.000; 435/468.000; 536/023.100; 536/023.600; 800/295.000
IC [6]
ICM: C12N015-29
ICS: C12N015-82; A01H004-00; A01H005-10
EXF 435/69.1; 435/70.1; 435/468; 435/410; 435/419; 435/320.1; 435/418;
536/23.6; 536/23.1; 800/278; 800/295
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 6 OF 7 USPATFULL on STN
AN 1998:161854 USPATFULL
TI Phytorecovery of metals using seedlings
IN Kapulnik, Yoram, Highland Park, NJ, United States
Ensley, Burt, Newtown, PA, United States
Raskin, Ilya, Manalapan, NJ, United States
PA Phytotech, Inc., Monmouth Junction, NJ, United States (U.S. corporation)
PI US 5853576 19981229
AI US 1997-911655 19970815 (8)
RLI Division of Ser. No. US 1996-602078, filed on 15 Feb 1996, now patented,
Pat. No. US 5728300
DT Utility
FS Granted
LN.CNT 1011

INCL INCLM: 210/150.000
INCLS: 210/170.000; 210/602.000; 210/198.100; 210/251.000; 047/063.000;
047/059.000
NCL NCLM: 210/150.000
NCLS: 047/059.000R; 047/063.000; 210/170.000; 210/198.100; 210/251.000;
210/602.000

IC [6]
ICM: C02F003-32
EXF 047/60; 047/61; 047/63; 047/64; 210/150; 210/151; 210/170; 210/602;
210/747; 210/610; 210/611; 210/620; 210/631; 210/911-913; 210/198.1;
210/251

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L8 ANSWER 7 OF 7 USPATFULL on STN
AN 1998:27685 USPATFULL
TI Phytorecovery of metals using seedlings
IN Kapulnik, Yoram, Highland Park, NJ, United States
Ensley, Burt, Newtown, PA, United States
Raskin, Ilya, Manalapan, NJ, United States
PA Phytotech, Inc., Monmouth Junction, NJ, United States (U.S. corporation)
PI US 5728300 19980317
AI US 1996-602078 19960215 (8)
DT Utility
FS Granted
LN.CNT 1035
INCL INCLM: 210/602.000
INCLS: 210/620.000; 210/911.000
NCL NCLM: 210/602.000
NCLS: 210/620.000; 210/911.000
IC [6]
ICM: C02F003-32
EXF 210/602; 210/747; 210/610; 210/611; 210/620; 210/631; 210/911-913
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> FIL STNGUIDE

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	659.92	660.25

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-3.65	-3.65

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FILE 'CAPLUS, BIOSIS, AGRICOLA, MEDLINE, CAOLD, CASREACT, CROPU, DGENE,
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L1 2721 S (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM
L2 1372 S (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM
L3 1001 S (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA OR LYCIUM
L4 229 S L3 NOT PY>1999
L5 210 DUP REMOV L4 (19 DUPLICATES REMOVED)

L6 6 S L4 AND METAL (3A) ACCUMULATING (2A) CROP?
L7 46 S L4 AND (TOMATO OR POTATO OR PEPPER OR EGGPLANT OR PETUNIA O
L8 7 S L7 AND (ECS OR PHYTOCHELATIN OR GAMMA GLUTAMYL CYSTEINE)

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